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ABSTRACT

This report describes a biology course designed to be offered to first-year students at the University of New South Wales in Australia. It also covers the planning, development and implementation of the course as well as its evaluation over a three year period (1974-1976). The publication consists of six major sections: (1) introduction, which presents background to the course, students served by the course and staff servicing the course; (2) planning and implementing the course, which presents principles, methods and problems of implementation; (3) teaching methods, which is divided into two major inputs, information and teaching of skills; (4) feedback to students; (5) evaluation of the course, which includes student and staff evaluation; and (6) general discussion, which presents successes and failures of teaching methods used. In addition, a preface, acknowledgements, references list, and appendices are presented. (RM)

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BIOLOGY OF MANKIND - AN INNOVATIVE
COURSE FOR FIRST YEAR STUDENTS

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H.P. RAMSAY, A.E. WOOD & J.M.E. ANDERSON

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BIOLOGY OF MANKIND - AN INNOVATIVE COURSE FOR FIRST YEAR STUDENTS

by

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Preface

The course "Biology of Mankind" was introduced in 1974 as a 14 week one session course presented to all students taking biology in their first year at the University of New South Wales. Between 800 and 900 students were enrolled from faculties and courses covering a wide range of disciplines e.g. Science, Applied Science (Food Technology, Wool & Pastoral Science), Optometry, Psychology and Arts.

Biology of Mankind represented an educational innovation in both content and presentation. It attempted to bring students, at the beginning of their University career, to a realisation that biology was as broad as well as a specialised science embracing many disciplines and at the same time introduce them to a variety of learning experiences. When the course was introduced there was a world wide movement asking biologists to suggest solutions to the world problems of population control, conservation of resources, energy requirements for which a knowledge and understanding of biological and ecological principles became necessary. At the same time students were also asking for a course more relevant to them as human beings searching for solutions to problems of the environment.

As a course it departed radically in content and teaching methods from the more traditional biology courses in most Universities at that time and from the previous course General & Human Biology taught at this University. In 1977 it was still the only course of its kind taught to all first year students studying biology regardless of their later specialities. Courses at other Universities with similar names or content were provided mainly for the non-science groups of students. It attempted to provoke an awareness in the student, of the need for a scientific approach to offset the emotional and often political discussions of what are essentially biological problems which require detailed and accurate analysis before solutions can be suggested.

At its inception it was considered that a course of this kind was highly suitable as an introduction to biology in the University as it catered for interests in so many disciplines as well as being of value to students wishing to major in biology.

Biology of Mankind will not be offered in 1978 following changes in the courses to be taught and a reorganisation of the staffing and responsibilities for first year biology courses.

This report presents a case-study of this innovation in biology teaching and covers the planning, development and implementation of the course as well as its evaluation over a three year period. In the discussion an attempt is made to identify its successes and failures and the influence some of its teaching methods have had on the second session course for which it was a prerequisite and our approach to Biology teaching in general.

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INTRODUCTION

There are many approaches to teaching biology in use at Universities today and a great variety of curricula taught. In 1968 the University of New South Wales was the first in Australia to introduce some Human Biology into first year courses for students in all faculties in their full year course known as General and Human Biology. The Human Biology content had a strong medical bias although it was taught to students with a wide range of interest. The new course "Biology of Mankind" sought to move away from the concept of man to the idea of men, from individuals to populations, a move to a broad, world centred, environmental approach incorporating a multidisciplinary viewpoint. When the course was first proposed suitable texts were difficult to find but the available literature has now expanded enormously indicating an upsurge of interest in this field. Newspapers and other media continually make the general public aware of problems of population, ecology, pollution, conservation etc., and it is important for all biologists to become informed so that they will be able to assess data critically, have an educated understanding of and be able to propose solutions for issues vital to the future of mankind. There is no doubt that a course of this kind is both contemporary and relevant. It also represents a broad approach to biology considered suitable for a wide range of students as it is multidisciplinary in its concept.

When students enter this University, following the Higher School Certificate, their background knowledge of Biology ranges from none since the school certificate 2 years before, to specialisation at matriculation (Web of Life Biology). Those with no biology at matriculation ranged from 11% in 1974 to 13% in 1975 and 18% in 1976 increasing to 33% in 1977 following further changes in the H.S.C. The course was first introduced in 1974 under the title Human Biology but the name was altered for 1975 to 1977 to indicate more clearly the nature of the course.

1.1 Background to the course

In a document presented to the Faculty of Biological Sciences in October 1972, Professor D.J. Anderson and Dr. E.M. Russell proposed the introduction of two one session (14 week) courses for First Year Biology

students to replace the whole year course General & Human Biology. The new courses were to be Human Biology and Comparative Functional Biology with Human Biology being taught in the first session. The first year course was particularly important for students as it formed a significant introductory experience of University and might contribute substantially to their attitudes and academic behaviour throughout the remainder of their University careers. The following attributes were regarded as important for such an introductory course. It was argued that it should -

- be attractive and stimulating to students since it was an introductory experience for students entering University;

- offer some element of novelty and not merely follow school experience;

- hold student interest by challenge and relevance;

- promote a broad educational platform rather than a narrow scientific viewpoint;

- be a sound basis for other courses;

- and give students an understanding of themselves as individuals, members of social groups and participants in an evolving system in relation to the environment.

The first Year Biology Management Committee set up a small working party consisting of Professor Anderson, Drs. Russell, Shipp and Wood, who submitted proposals in May 1973 which formed the basis for the development of the course to be introduced in 1974.

As this course was to be presented to students in first session at University it was particularly important that it should help them make the transition from school to university as smoothly and as soon as possible, as well as to introduce them to biology at the tertiary level. If the course, in addition to teaching them skills and biological knowledge, could encourage them to become self-reliant, to learn how to use available resources such as the library, to learn effectively on their own and co-operate with others in a group, it would help to achieve this transition.

A multi-media approach was chosen as most appropriate for presentation of the course as it would involve all the senses to the maximum extent possible. Thus lectures were to be live or on television, tutorials would be discussions based on preparatory reading, demonstrations (visual material), audio-visual programmes, and reading programmes would replace one lecture per week to give greater scope for use of available media. Laboratory classes would use television and films as well as requiring students to do experiments, become proficient at using apparatus etc. Because of the broad nature of the

course students would be expected to use a variety of references provided in the library. If successful, students would be well equipped to proceed to more specialised courses in biology in the second session.

1.2 Students Serviced by the Course

Table 1 shows the distribution of students by Faculty for 1974-77. As a result of curriculum changes medical students no longer took the course after 1974.

TABLE 1.
% STUDENTS ENROLLED BY FACULTY IN 1974-77

	SCIENCE	APPLIED SCIENCE	SCIENCE EDUCATION	ARTS	MEDICINE	OTHERS	N
1974	38.0	7.0	10.4	5.2	26.1	13.3	965
1975	51.3	14.1	13.5	6.3	0	14.8	784
1976	56.9	11.2	14.6	6.4	0	10.9	828
1977	58.0	14.2	6.4	10.2	0	11.2	920

During this period changes in science curricula at schools have also occurred, leading to a shift in emphasis of the background knowledge of students entering University. In 1974, 79% of students took multi-strand Wyndham Science for matriculation. This subject was basically a non-descriptive analytical science course in which biology was an optional strand but taken by the majority. New trial science courses were being introduced into schools in which Web of Life Biology gave a more experimental and investigative approach to the subject. The proportion of students taking Wyndham Science was still 70% in 1975 but had reduced to 55% in 1976 while Web of Life Biology was taken by 17% and increased to 25% in 1976. With trial science courses, students could choose to do Physics, Chemistry or Geology in place of Biology hence, the increase from 11% (1974) to 13% (1975), 18% (1976) and 33% (1977) of students with no biology at matriculation.

1.3 Staff Servicing the Course

The First Year Biology Teaching Unit, consisted of a Director, two Senior Tutors, three Tutors, a Professional Officer, 4 Technical Staff and two clerical/typing staff.

The Unit staff were responsible for -

- (i) preparing teaching materials e.g. Laboratory Notes, Study Guides, Self-Tests, Demonstrations, Audio-Visual Programmes etc.,
- (ii) supervision of all laboratory classes,
- (iii) organisation and briefing of staff for laboratory classes,
- (iv) coordination and briefing of all tutors as well as taking a large proportion of tutorials,
- (v) student assessments, exams etc.

In addition, teaching help was supplied by 23-30 part-time demonstrators for laboratory classes and about 30 members of full-time staff from the Schools of Botany and Zoology for tutorials. The lectures were given by staff from the Faculty of Biological Sciences or by guest lecturers.

2. PLANNING AND IMPLEMENTING THE COURSE

2.1 Process of Planning

After formulation of aims and an outline of the course by the working party in 1973 a committee was established to design the course for introduction in 1974. The emphasis in development of the course was team work rather than individual effort. A model of the process of planning the course is presented in figure 1 and the mode of implementation in figure 2.

Once the course was introduced in 1974 the committee continued to evaluate and upgrade the course from feed-back given by information obtained from staff and students.

2.2 Principles of Implementation

These were set down by the committee in 1973 as follows:-

- (a) All sections of the course should be planned so as to be closely integrated and should be systematically evaluated.
- (b) A variety of methods of teaching should be used including -
 - (i) live lectures where appropriate, particularly for keynote areas and perspective,
 - (ii) television in the form of special programmes where the material to be presented is well suited to the medium,
 - (iii) audio-visual and programmed self-instruction where these are appropriate,
 - (iv) small group learning where valuable.

- (v) practical work of a variety of kinds from learning specific skills and techniques of problem-solving to open-ended innovative and experimental investigations.
- (c) Assessment of students should be made continuously during the course on work carried out as well as by a final examination.

2.3 Methods of Implementation

Implementation of the principles required consultation between members of the committee and the staff who were writing the course (e.g. lecturers, tutors etc) using the programme agreed upon. The teaching method most suitable for each aspect of the subject matter was selected.

Responsibility for production of materials for use by students was assigned to individuals. Aims and objectives were written for each laboratory class and class notes prepared. All parts of the curriculum were co-ordinated to prevent contradiction and unnecessary repetition.

A policy of continuous assessment was formulated and applied. This assessment included correction of selected sections of laboratory work on a weekly basis, short multiple choice tests on knowledge of laboratory work, essays, assignments and projects, all of which contributed 50% of the marks; a final multiple choice examination provided the other 50%. (Appendix 5).

2.4 Problems of Implementation

The proposal for the new course being introduced in 1974 was put forward with the request that a second senior tutor (there being only one on the staff in 1973) should be appointed to assist in its development. Unfortunately appointment was not made until May 1974, 3 weeks before the course finished. For a variety of reasons, there were other complications in presenting the course in 1974. Scheduled building alterations were not completed before the teaching year began and some work continued during the teaching session. Teaching materials such as laboratory notes and lecture summaries were not available to either staff or students more than 2 weeks in advance making it difficult for the whole course to be seen in perspective. Some of the reference books for the library did not arrive in time causing frustration among students. These problems should be considered when studying student and staff evaluation of the course in 1974.

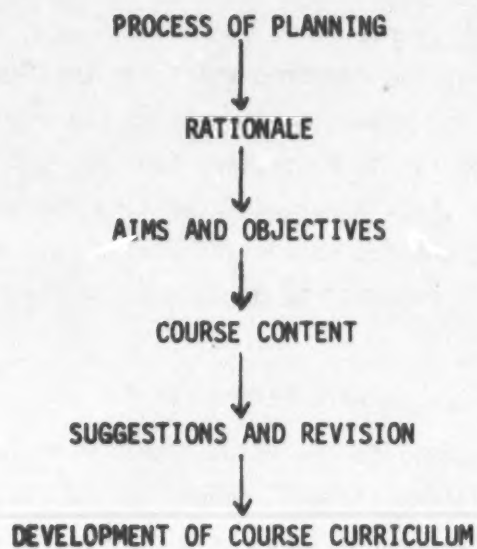


Figure 1.



Figure 2.

2.5 Development of the Course

The appointment of the required staff and the feedback gained from discussion with staff and students, as well as the results of questionnaires in 1974, enabled the course to be revised for 1975 and again for 1976. Some further changes in the staff involved in writing the course also introduced new points of view and changes in content during this period and again in 1977. The article will concentrate on discussing the course in operation during the period 1975-76.

The aims of the course were defined as follows:-

- (a) To introduce students to the major lines of biological enquiry.
- (b) To encourage critical thought, deduction and analysis.
- (c) To illustrate how present ideas have arisen and so to demonstrate scientific method.
- (d) To provide a broad educational background in relevant contemporary biology.
- (e) To introduce students to a comprehensive and integrated treatment of man's biology and culture.
- (f) To bring together knowledge from different disciplines and to evaluate this knowledge in terms of the human situation.

An overall plan of Biology of Mankind in terms of inputs and outputs is presented in figure 3, while the course programme for 1976 is presented in Table 2.

3. TEACHING METHODS

Teaching methods varied to some extent in different years. In 1976 the greatest variety in multi-media approach was used and will be discussed here.

3.1 Introduction

The subject matter was divided into a series of weekly themes forming modules around which the teaching materials were designed. The themes traced the evolutionary development of man in relation to his environment and emphasised the necessity for a scientific approach to man's problems and management of natural resources (Table 2).

Within each module the subject matter most suitable for use in lectures, laboratory classes or tutorials was selected and the type of presentation most suitable e.g. live lecture, television, experiment, discussion, demonstration etc., determined for each aspect to be covered. (Appendix 4).

The various methods to be used in the teaching programme were sub-

TABLE 2
17.011 BIOLOGY OF HANKIND 1976

WEEK	THEME	LECTURE I	SUPPLEMENTARY INFORMATION	TUTORIAL	LABORATORY	ASSESSMENT
1	Present Situation	Present Situation (LIVE)	World Population, Food and Resources (D)		Use and Care of Biological Tools	
2	Ecosystems and Energy Flow	The Ecosystem Concept (LIVE)	Energy Flow in Ecosystems (R.P.)	Ecosystems and Energy Flow	Ecology of Aquatic and Terrestrial Ecosystems	
3	Evolution of Man	Primate and Human Evolution (T.V.)	Human Physique (A.V.) Speech and Human Evolution (T.V.)	Development of Social Behaviour I. Primates	Evolution and Variation in Man	
4	Development of Hunter-Gatherer Society	Man as a Tool Maker and Social Animal (T.V.)	The Desert People (F) Communication in Animals (D)	The Hunter-Gatherer Life	Food Sources for Man	Lab. Assessment 1
5	Development of Agricultural Man	Domestication of Plants and Animals (T.V.)	Origins of Domesticated Plants and Animals Selection & Breeding (D)	Domestication of Plants and Animals	Improving Food and Fibre for Man	Test 1 (Labs 1-4) Lab. Assessment 2
6	Methods of Utilization of Natural Resources	Resource Utilization (LIVE)	Energy Flow in Resource Utilization (A.V.)	Resource Utilization	Soil as an Ecosystem	Assignment 1 Lab. Assessment 3
7/8	Urbanization	The City as an Ecosystem (LIVE)	Origins and Historical Development of Urbanization (D)	The City as an "Ecosystem"	Principles of Genetics	
9	Population Structure	Population Dynamics (LIVE)	Population Structure in Animals (R.P.)	Human Population Structure and Control	Population Genetics	
10	Population Control and Genetics	Human Reproduction and Population Stability (LIVE)	Origin & Distribution of Human Races (A.V.)	Genetics	Population Growth	Test 2 (Labs 5-9) Assignment 2

M A Y R E C E S S

11	Biological Stress	Crowding (LIVE)	Physiology of Stress (R.P.)	Stress	Biological Stress	<i>Tribolium</i> Expt.
12	Disease	The Natural History of Disease and Evolution of Public Health (LIVE)	Disease and Control of Populations (D)	Disease	Microorganisms and Human Welfare	Assignment 3 - Pollution Project
13	Impact of Society on the Environment	The Impact of Modern Technology (T.V.)	Environmental Pollution (A.V.)	Pollution	Pollution	Test 3 (Labs 10-12)
14	Management of Resources	Resources of the Future (LIVE)	Management of the Environment (D)	Conservation	Assessment of the Environment	

KEY:

F. = FILM
R.P. = READING PROGRAMME
L. = LECTURE

A.V. = AUDIO-VISUAL
D. = DEMONSTRATION
T.V. = TELEVISION PROGRAMME

THE BIOLOGY OF MANKIND : STUDENTS INPUTS AND GAINS

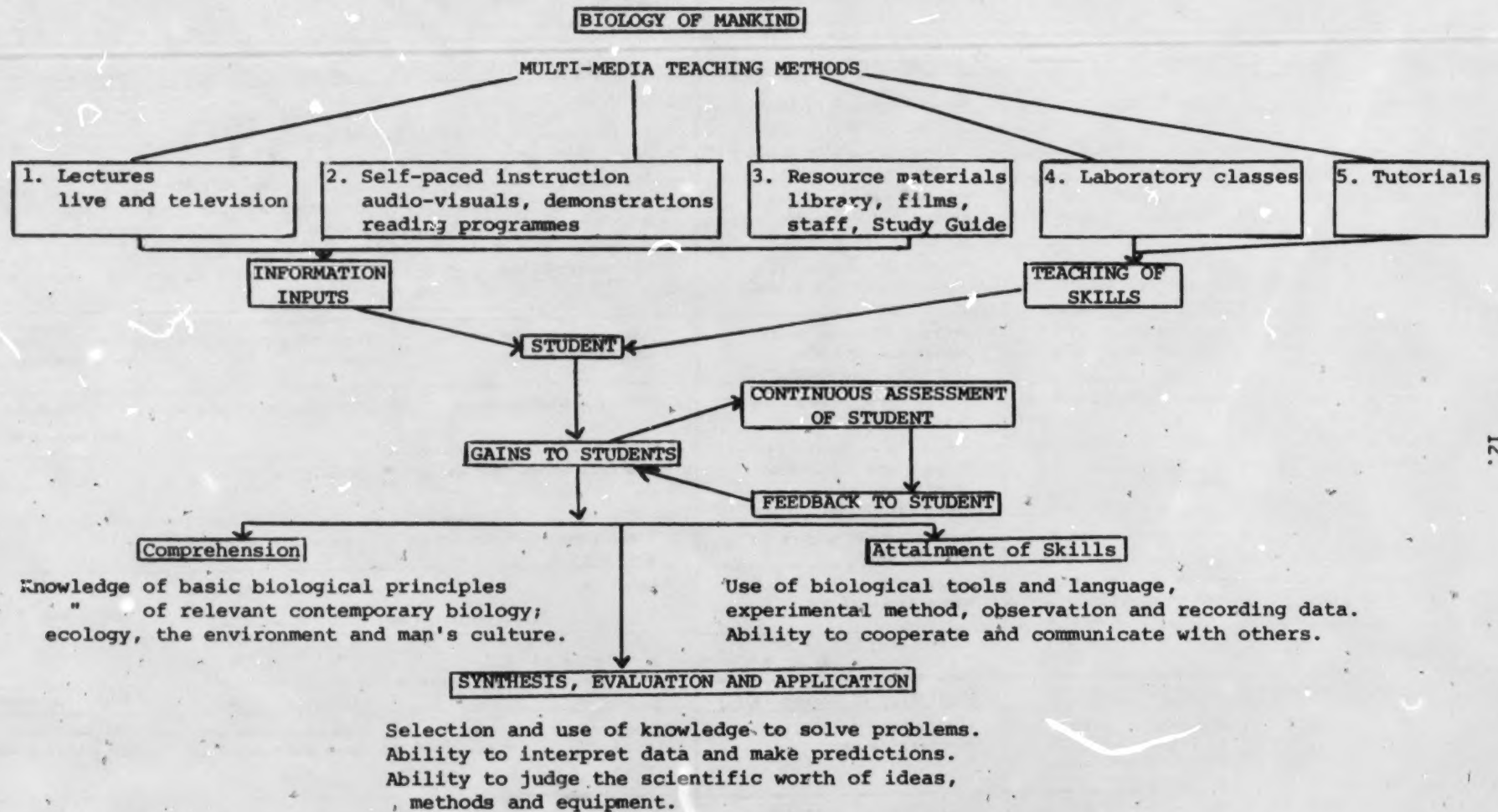


Figure 1.

divided into two major inputs, information and teaching of skills (see Fig.3).

3.2 Information

The primary sources of information for students were seen as lectures, self-paced forms of instruction and use of resource materials, library etc.

A. Lectures

The aim of lectures was to give a general coverage of specific areas of the course and to highlight important aspects. A summary was provided for each lecture and students were referred to text and reference books for further information. Cassette tapes of lectures were later placed in the library and copies of all graphics used displayed in the Demonstration Laboratory. Lecturers had the choice of presenting their material either live (to 700-800 students in one large theatre) or as a television programme to be replayed over the Closed Circuit Television at the normal lecture time. In 1974 two lectures per week were given of which about half were live lectures and the other half on television. In 1975 formal lecture times were reduced to one per week and self-paced forms of instruction introduced in place of the second lecture. These were continued in 1976 and a lecture alternative in the form of a reading list was provided for students preferring to learn by this method rather than attending lectures.

B. Self-Paced Forms of Instruction

Three kinds of self-paced forms of instruction, (Audio-Visual Programmes, Reading Programmes and Demonstrations) designed to enable students to proceed at a rate suited to their understanding and background in the topic, were introduced. Their advantage was that the information was available for an extended period (3 weeks or more) rather than given at a set time as in a lecture.

It was expected that students would take 1-1½ hours per week to complete each programme and the content was seen as a lecture equivalent.

- (1) Audio-visual programmes: Comprised a tape and associated diagrams, charts and slides. They are accompanied by a series of questions designed to test information intake. The programmes were available in the library for several weeks.

- (ii) Reading programmes: A basic core of information was outlined and specific concepts expanded by reference to particular books or articles on special reserve in the library. Questions for feedback on interpretation of the material were included. Extension reading references were also included for those wishing to study the topic more deeply.
- (iii) Demonstrations: Photographs, charts, specimens and short descriptions were integrated into a display on specific topics. A question sheet or set of objectives was provided to help students follow the most important aspects of the display. The demonstrations were displayed in a large Demonstration Laboratory (see Ramsay, H.P., 1973).

C. Resource Materials

Because of the nature of the course students were encouraged to read as widely as possible. A list of reference articles and books (Appendix 3) was given in the Study Guide (Appendix 2) and copies of references placed on Reserve in the library. Other resource materials included optional films, tape-slide programmes in the Demonstration Laboratory and displays of recent articles on relevant topics. In addition, a member of Staff of the First Year Biology Teaching Unit was available at all times as a resource person to answer questions, discuss the course or provide further data as required.

3.3 Learning of Skills

Such skills as handling of equipment, examination of biological materials, discussion of results, observation, recording of data, use of biological language were considered important. These were grouped into those best learnt in a laboratory situation and those most suitably acquired in a small group tutorial setting.

A. Laboratory Classes

Students, in groups of 42, were assigned to a 3 hour laboratory class which they attended at a specified time each week. The class operated under a Supervisor and 3 Demonstrators.

The Laboratory Manual (Appendix 1), purchased by students at the commencement of the course, contained a statement of overall aims and organisational procedures, followed by a complete work schedule for each class.

The aims and specific objectives were clearly stated at the beginning, followed by instructions designed to enable the student to work at his own pace for most of the period for each class. Questions were inserted and exercises to be done defined for each section of the work.

For some classes, experiments or collecting of data were best done in small groups and students were encouraged to co-operate with each other in this way. Specified selected sections of work were collected for assessment and marked by the Demonstrators. The staff assisting in the class were expected to allow students to do their own work, their function being primarily to monitor progress or to discuss with students improvement of techniques or comment on their understanding of work rather than to give them answers to questions.

To increase interest in laboratory work students were required to bring in data when appropriate e.g. particles or microorganisms from different environments, water samples for analysis, soil samples, epidemiological survey of the family, etc., for identification and analysis in class. In 1976 a continuing experiment on population control; using the flour beetle *Tribolium*, was introduced.

The laboratory classes gave students experience in observing, recording and interpreting biological material and carrying out experiments. This included learning drawing skills; handling scientific equipment; measuring, recording and graphing data; and carrying out experimental procedures.

A separate Revision Laboratory catered for students who missed a class or who wished to revise or complete laboratory investigations. At the end of the week examples of class material were made available there for at least an extra week.

B. Tutorials

Tutorials were in the form of discussion sessions between small groups of students in a small tutorial room. A group of students was based on seating in the laboratory class. Each class was divided into groups of 10-12 students so that a tutorial group consisted of students who had contact with each other for 4 hours per week enabling a more relaxed atmosphere to operate in the tutorial sessions. The role of the tutor was one of participation NOT direction so that a friendly atmosphere would lead to open discussion. Tutors included members of the full-time teaching staff at all levels from the Schools of Botany and Zoology as well as First Year Biology Teaching Unit staff.

The aim of tutorials was to enable students to gain confidence in expressing their own points of view, substantiating arguments, listening to interpretations and ideas from others in the group, learning to use biological language and making judgements on the relevance of information. So that discussion would be as free as possible no assessment of student performance during tutorials was made. However, much of the tutorial material was aimed at integration of all aspects of the topic, to enable performance in tutorials to be reflected in other assessment procedures such as essay writing.

The types of material used for discussion varied from week to week and included:-

- a. discussion of a general topic e.g. hunter/gatherer societies;
- b. examination and interpretation of specific data e.g. population profiles;
- c. solving problems e.g. questions in genetics; or consideration of reference material.

All data relevant for use in the tutorial such as references and discussion topics were published in a Study Guide (Appendix 1) purchased by students.

It was hoped that the group would become relatively self-sufficient and accept the tutor as a member rather than as a leader. A group would thus be able to function relatively effectively, because of the group contribution, in the absence of the tutor.

4. FEEDBACK TO STUDENTS

Each student obtained regular feedback on his progress in two main ways -

- a. through personal communication by discussion with tutors, demonstrators etc.
- b. from marks obtained in the various assessments.

So that the feedback would be facilitated a programme of continuous assessment was chosen. The forms of continuous assessment varied somewhat from year to year. In 1976 assessment consisted of short multiple choice tests in laboratories with opportunity later to go through the paper and discuss answers; oral tests; written experiments or projects; assignments or essays usually based on tutorial topics. All essays were marked and returned to students with comments. These continuous assessments contributed 50% to the final mark, (Appendix 5).

5. EVALUATION OF THE COURSE

5.1 Introduction

In recent years more attention has been given to student opinion in evaluating the types of courses presented and in the teaching methods being used. In courses for small numbers of students there is immediate feedback to the teacher through personal contact but in courses with large numbers of students and many staff members the verbal feedback may come only from the dissatisfied vocal person and it may be difficult to accurately judge the overall opinions of students. The greatest problem, however, is to design a questionnaire which can be considered reliable in its analysis of student opinion, and in which a student is most likely to be truthful. We were fortunate in having optical scanning facilities which facilitated analysis of results enabling us to ask a large number of questions. The questions were in a multiple choice format with separate answer sheets to be marked by the student for computer analysis later. Some margin of error is likely with this method as students may block out the wrong alternative by mistake e.g. answer A instead of B. Since the students were familiar with the answer sheet, having used it several times during the course for tests, we felt chances of such error were not significant. To assure ourselves that a reliable sample of opinions was obtained, the questionnaires were answered by students in the last laboratory period and a good response across the population was obtained. Another area of possible error which cannot be identified easily is the memory of students in retrospect. To overcome these problems we carried out both continuous and overall evaluations by both staff and students as summarised in Figure 1. Our overall evaluation of the

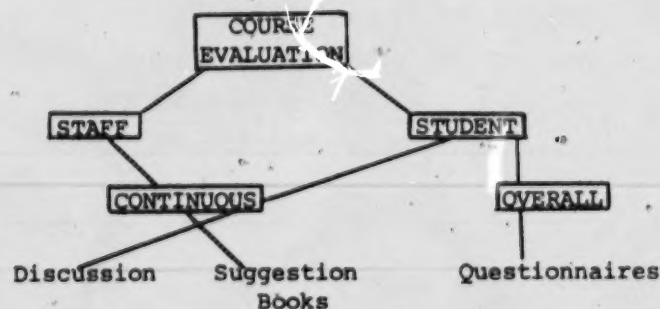


Figure 1.

course has included analysis of content and teaching methods at all levels. The Tertiary Education Research Centre co-operated in the 1974 survey and gave helpful advice in designing a questionnaire for 1975, some questions being repeated, and new ones added for use in 1976. TERC assisted in the analysis of data for each.

5.2 Student Evaluation

Questionnaires were completed at the end of the course by students in 1974, 75 and 76. More open ended questions and new questions on areas where greatest difficulty was indicated in the previous year were added in 1975. Fewer questions were used in the 1976 survey, key questions being repeated and some additional questions on areas not previously evaluated being included. The response (Table 3) by a large proportion of the student body from all faculties provided useful data.

TABLE 3.
STUDENT EVALUATION RESPONSE

	STUDENT ENROLMENT	QUESTIONNAIRES ANALYSED	% RESPONSE
1974	965	794	82%
1975	784	561	71%
1976	828	561	67%*

* A flu epidemic at this time reduced the number of responses in 1976

However, differences in samples have to be considered when analysing the student responses. In 1974 almost one quarter of the students were from the Faculty of Medicine. In 1975 and 1976 medical students no longer took the course due to changes in that Faculty's requirements. The samples in 1975 and 1976 are fairly equivalent in distribution by course or faculty. Variation in size of faculty groups made it difficult to determine whether differences between faculty groups in ranking the alternatives offered in questions were important.

The results presented here give data for all years that the particular questions were used, so in some cases this is for 1974, 1975 and 1976 and in others only one or two of these. Student populations questioned in 1975 were comparable in courses represented so that large differences between these and 1974 responses could have been due in part to the substantial medical group. The 1974 data are included, however, to show how a large body of students with specific interests can influence the overall data in a significant way. Other factors too, in 1974 (mentioned earlier) also biased the results for that year. All results quoted are the percentage response to questions.

5.21 Approach to Course

a. Reasons for taking Biology

	1974	1975
Compulsory	66	56
Not compulsory and wanted to study biology	20	26
Not compulsory took it because of timetable clash	1	1
Not compulsory took it to see what it was like	4	6
Not compulsory could be useful for career prospects	9	11

b. Background

	1974	1975	1976
Biological background to matriculation	89	87	82
No biology (at least since 4th Form)	11	13	18

Most students had some biology to matriculation and for the majority it was a compulsory subject for their course at University. Of those for whom it was not compulsory, only about 6-7% had no real motivation for taking it. About 50% of students expected to continue with biological subjects after first year.

c. Expectations & Interest

i. Interest in Biology at beginning of Course

	1974	1975
Very interested	42	40
Moderately interested	52	56
Not at all interested	6	4

ii. Was this interest maintained

	1974	1975
still interested or very interested	57	65
less interested or disappointed	41	31
made wrong choice	2	3

iii. Interest at end of course

	1974	1975	1976
as interesting or more interesting than expected	38	57	58
less interesting	44	40	36
didn't expect it to be interesting	18	3	6

While 90-95% were moderately to very interested in Biology before commencing the course, 41% in 1974 and 31% in 1975 were less interested or disappointed at the end of the course. There was an increase in the percentage of students who found the course as interesting or more interesting than expected from 1974 to 1976. The presence of the Medical students in 1974 could account for the lower figure for interest in that year as the content did not have a medical bias.

d. Subject matter

A question on subject matter revealed that in 1974 over 90% of students expected a lot of emphasis on -

Structure and Function of the Human Body (92%)

Relationship of Man to the World in which he Lives (92%)

Ecological Problems of Human Society (91%)

and over 80% expected some to a lot of emphasis on -

Social and Anthropological Development of the Human Species (85%),
Evolution of Man (84%)

but 48% expected NO emphasis on Plant Biology.

In 1975 and 1976 the question was reworded to find out on what aspects students expected more, less or no emphasis with the following results -

	1975	1976
More emphasis		
Structure and Function of the Human Body	59	57
Less or no-emphasis		
Plant Biology	42	43
Ecological Problems of Human Society	31	27
Social and Anthropological Development of the Human Species	30	29

	1975	1976
As much as was expected was given on -		
Evolution of Man	53	54
Social & Anthropological Development of the Human Species	49	49
Relationship of Man to the World in which he lives	47	55
Ecological Problems of Human Society	40	48

The comparability of responses in 1975, 1976 is very interesting. It is clear that a majority of students expected more on the structure and function of the human body as no other aspect received more than a 20% vote. A substantial majority in all 3 years did not expect much emphasis on plant biology. Students seemed more satisfied with the two sections, relationship of man to the world and ecological problems of human society, where an 8% shift in opinion in favour of the amount of emphasis occurred between 1975 and 1976.

e. Enjoyment

	1974	1975	1976
Compared with other subjects Biology of Mankind was -			
more or much more enjoyable	29	39	35
about the same	42	44	43
less enjoyable	29	17	21

f. Criticisms & Disappointments

5.23 Teaching Methods

The most disappointing aspect of the course was -

Lectures	30	37	42
Laboratories	35	25	19
Course content	22	21	22
Tutorials	9	10	12
Amount of contact with staff & other students	-	5	2

Questions specifically on lectures revealed that the most disappointing aspects of lectures were -

Lecturing ability of lecturers	32	24	27
Presentation by T.V.	30	40	26
Subject matter or topics	8	11	24
Lack of opportunity to ask questions or make personal contact	14	11	8

The major disappointment moved from laboratory classes in 1974 to lectures in 1975 a trend which was continued in 1976. Voting on course content and tutorials remained fairly stable although there was some slight increase (2%) in disappointment with tutorials between 1975 and 1976.

i. Lectures

In further questions specifically related to lectures, 65% (1974) - 63% (1975) were not satisfied. Lecturing ability of lecturers was also strongly criticised particularly in 1974 (32%). The amount of criticism of television was greatly reduced between 1975 and 1976 although the actual T.V. programmes used were identical. It is clear however that television lectures remained unpopular with a large number of students.

Student opinions on the contribution of lectures to the course were as follows -

	1974	1975
a. gave them an overview of the course	50	48
b. saved them doing a lot of reading	30	22
c. indicated what was likely in the exam	23	17
d. necessary to overcome deficiencies in the text	18	11
e. stimulation	23	17
	14	18

Lecture summaries provided were voted useful in complementing lectures and 75% (1974), 87% (1975) and 90% (1976) of students made some use of the summaries either before or after the lecture. Only 32% (1974) considered the summary as a substitute for attending a lecture.

ii. Laboratory Classes

The attitude to laboratory classes suggested that there should be more detailed instructions given [60% (1974), 54% (1975)] although some improvement between 1974 and 1975 was apparent. It was agreed that practical work was an interesting part of the course [56% (1974), 65% (1975)] with an increase in interest between 1974 and 1975. The statement of aims and objectives for each practical class was considered useful [62% (1974), 63% (1975)] but was not useful in enabling students to assess themselves on how they performed in class [62% (1974), 26% (1975)]. Students were evenly divided on whether the aims and objectives helped them to know how to go about a practical class, with 49% (1974 and 1975) believing that they did. In 1975

although they felt that too much was expected and work set could seldom be finished in class (79%) they agreed that what was required related well to the course in general (75%).

In 1976 questions on laboratory classes were aimed at the type of assessment they preferred. A large majority, (95%), wanted formal assessment of laboratory work. Students preferred to hand in work a week later and have a specified section assessed with some credit for completeness (52%) although quite a few (27%) preferred to hand in a specified section at the end of the class. Only 13% wanted an unspecified section marked. In fact, during the course, the first two systems mentioned had operated depending on the type of work to be assessed. Students found the Demonstrators marked fairly (71%), accurately (65%), discussed errors with them (58%) and did not spend too much class time marking (72%).

iii. Tutorials

More than two thirds of the population was reasonably to very satisfied with tutorials [69% (1974), 72% (1975), 70% (1976)] with an improvement between 1974 and 1975. The majority prepared for tutorials with 21% (1974) and 18% (1975) rarely or never preparing. The most important factors in determining whether a tutorial was useful were -

	1974	1975	1976
willingness of others to co-operate	29	29	24
the topic	21	22	22
amount of preparation	19	17	18
knowledge of others in group	11	11	12
the way the tutor handled the group	17	12	7

The most pleasing trend in these answers is the last, showing fewer students from 1974 to 1976 feeling that the way the tutor handled the group was important. One of the aims of the small group tutorials was to encourage the members to take more responsibility and depend less on the tutor. The type of written material supplied for use in tutorials and the growing acceptance that tutors should be a member rather than the dominant figure in the group seems to have been reasonably effective. The type of topics and the willingness of others to co-operate were seen as the most important factors in the success of a tutorial.

Other questions related to the contribution of students to the tutorial. In 1975 we asked them what contribution they made and 16% admitted to seldom or never contributing. In 1976 the group attitude was sought and although 18% considered that only 2 or 3 ever had much to say the rest considered that most, to all, group members contributed.

Student opinion of the attitude of their tutor was investigated with the following results

	1974	1975	1976
my tutor establishes friendly relations	76	85	84
my tutor made me interested in the subject	60	73	73
could get help from my tutor if needed	54	64	73
my tutor guided students by asking questions rather than giving answers	86	89	87
my tutor sought opinions about the course	60	62	62

It was pleasing that votes for tutors establishing friendly relations, interesting students in the subject and being helpful were high and the similarity of the response over the three years to the last two questions on seeking of opinions and guidance rather than answer-giving, revealed that tutorials were achieving some of their aims for the majority of students.

iv. Use of Resources

Students were questioned on their use of the library and 29% (1974), 24% (1975), 16% (1976) claimed to have made little or no use of the library. Frustration may have contributed to this in 1974 when references ordered did not arrive (17% in 1974 claimed lack of references as their reason) and to some extent this also applied in 1975 (17%) as number of books on reserve were small for so large a population. There seemed to be some improvement and more students were making use of the library facilities in 1976 with fewer complaints being made.

An estimate of the time students considered they would need to spend in the library each week to complete the work was -

	1975	1976
2- 3 hours	43	35
4- 6 hours	36	41
7-10 hours	13	19

Use of the audio-visuals, reading programmes and demonstrations which replaced one lecture per week in 1975 and 1976 brought the following responses -

	1975	1976
worked through all demonstrations	17	28
" " " audio-visuals	30	24
" " " reading programmes	14	12
did not look at demonstrations	4	3
worked through some demonstrations	96	97
made no use of audio-visuals	37	25

These results indicated that demonstrations were used by most students but that reading programmes and audio-visuals were completed by only a small percentage of students. Data collected by the library on use of audio-visuals substantiated these claims. (Tables 2 and 3).

TABLE 2.
DATA ON USE OF AUDIO-VISUAL PROGRAMMES

PROG.	1	2	3	4
1975	329 (43%)	368 (48%)	224 (29%)	241 (31%)
1976	455 (56%)	407 (50%)	251 (30%)	222 (27%)

TABLE 3.
MONTHLY USE OF A.V. PROGRAMMES AND
LECTURE TAPES IN 1976

	MARCH	APRIL	MAY	JUNE	TOTAL
Prog. 1	358	56	11	30	455
2	-	324	62	21	407
3	-	-	195	56	251
4	-	-	7	215	222
Lecture Tapes	3	9	3	27	42

The programmes require about 1-1½ hours to complete and it was clear from their use by students that, although they were an essential part of the course but were not scheduled for a particular time, students were less likely to complete them. They were placed in the library well before the week set down in the timetable and remained there for the rest of the Session. In Table 3 the distribution of use by month in 1976 shows that some students did not do even the first programme until the last month of the course.

The introduction in 1975 of a Study Guide which contained lecture summaries, tutorial discussion topics and other information previously issued weekly was considered moderately to very useful by almost all students (92%).

5.23 Feedback and Assessment

In 1975 (57%) and in 1976 (53%) found that part of the course which gave them most trouble was estimating what was required to be learnt. Only 24% students in 1974, 25% in 1975 and 37% in 1976 felt that they had received useful information about their progress during the course. This was in spite of the fact that 50% of their total marks had been allocated and all essay, tests and laboratory work assessments were supposed to have been discussed with them. This could reflect a false expectation on the part of students on the type of feedback which assessment gives them, but results seem to indicate a slight improvement in the situation in 1976.

A majority [47% (1974), 52% (1975)] felt too much weight was given to the final exam and would have preferred more weight on other forms of assessment [54% (1974), 57% (1975)]. Too much emphasis was placed on assessment according to 43% of students in 1975.

5.24 Overall Impression of the Course

In 1974, 1975 and 1976 students felt some lack of coherence in the course with only 12% in 1974, 20% in 1975 and 16% in 1976 feeling that the topics all fitted into a coherent scheme. However, over 50% did feel that the majority, if not all, of topics did relate and give the course some coherence.

In an open ended question students were asked to state what they considered were the aims and objectives of the course.

In 1974 the most popular response was that the aim of the course was to give some understanding of the relationship between man and his environment. The second most popular response was that the underlying aim of the course was to study man's evolution or history or development. A common reply was: "To understand man's place in the environment and his evolution".

Some responses (about 10%) mentioned the 'problems' or 'concerns' of

man. There were three broad categories of these:

- (i) the problems of man today : ecological and demographic problems such as pollution and population;
- (ii) the future of the human species and the future development of man;
- (iii) the 'raising of consciousness' of the students about these problems : to give students some insight into the world around them, to make them aware of the problems facing mankind.

In 1975 the aims were primarily seen as -

- a. Study of man in relation to environment.
- b. Study of man past, present and future.
- c. Attempts to study man, the problems he has created, and attempts to solve these.
- d. A broad overview of man's position in the world as a biological system.

There were both criticisms and compliments among the replies.

5.3 Staff Evaluation

All staff were given ample opportunity to evaluate the course. At the end of the course in 1974, those concerned were asked to record their criticisms and suggestions in writing. Soon after, separate meetings of demonstrators, tutors and Unit staff were held to discuss the problems of 1974 and plan for changes in 1975.

In 1975, suggestion books for staff and students were placed in laboratories and comments were recorded throughout the session. At the end of session separate meetings of demonstrators, tutors and Unit staff were again held and questionnaires were handed out. In 1976 we relied on suggestion books and verbal feedback during the course.

a. Demonstrators

In 1974 most criticism arose from the lack of living material in practical classes, and the excessive amount of work to assess at the end of each class. The most valuable feedback from Demonstrators came from discussion during the course and from the suggestion books where ideas for specific laboratory classes were written down in 1975 and 1976.

b. Tutors

In 1974 tutors expressed concern at the low level of student preparation for tutorials and that as a whole more specific biological subjects could have been included. They felt that differing views and interpretations were not adequately expressed in the course; especially in the anthropologically orientated areas. It was suggested that duplicated notes, tutorial questions etc., provided for the course be published in a Study Guide. This was introduced in 1975.

In 1975, a questionnaire was given to Tutors. It sought detailed information on specific tutorials, marking, assignments, student attendance and functioning of individual tutorials. Comments resulted in a restructuring and rewriting of tutorials in 1976, with emphasis on a shortening and annotating of the tutorial reading lists. There was a greater satisfaction with tutorials in 1976 by staff involved although the preparation and workload for students was still a problem to be overcome as many were not preparing effectively. Further revision along these lines were introduced in 1977.

c. Teaching Unit Staff

The Unit staff were most concerned with the practical work. They agreed there should be more living material in classes and that specific subjects should be studied in depth, rather than the more general approach taken in 1974. More skills should be taught. Staff also complained of the poor television lectures.

In 1975 staff felt the course had been more successful in achieving its objectives and this improvement was continued in subsequent years. Lectures and practical classes could still be much improved. The Study Guide, introduced in 1975, was considered a good addition to the course and revised for 1976 and 1977. As some dissatisfaction was still felt in 1976 with laboratory classes, it was in this area that major changes were implemented in 1977.

copying, improved film making and slide producing facilities necessitated revision by Universities of methods for imparting information. Students, having become familiar with most of this equipment at school, expect modern technology at University. It has been shown that traditional lecturing methods are not always as successful in terms of a student's retention of information when compared with use of other media and different teaching methods (Powell 1970, Hoffman and Druger 1971, Brewer 1974, Fisher 1976).

Questioning of and research into traditional University teaching methods although well advanced in U.S.A. by 1960 (McKeachie 1963) was just beginning in Britain (Beard 1967) and Australia. A great expansion in research has taken place since the late 1960's. Most Universities in Australia have some form of Education Research Centre serving as inter-disciplinary advisory group co-operating in research projects of many kinds and offering assistance to staff interested in improving their teaching methods. Beard (1972), in discussing varieties of learning, came to the conclusion that "courses should be flexibly organised with a diversity of choices and teaching methods, or evaluative techniques should be varied so that students have some choice of methods as well as of content in their studies". Bligh (1970) felt also that different aims in teaching were best achieved by use of different methods to obtain maximum impact.

The different types of media used in our Biology of Mankind course aimed at giving a variety of approaches to cater for individual preference in ways of perceiving the world e.g. audial, visual, as recommended by Beard (1972). It was hoped that variation in teaching methods would increase opportunities for face to face discussion between staff and students as well as between students with each other. While co-operation in laboratory activities would promote attitudes such as self reliance, co-operation, responsibility and enjoyment, students would at the same time develop mental, verbal and practical skills, and an ability for critical thinking. Oral and writing skills rated high on our list of objectives and we feel that helping students to communicate in biological language should be an essential objective of any course in biology.

6. GENERAL DISCUSSION

6.1 Introduction

Biology of Mankind was introduced as a First Year Biology Course, partly to satisfy student and staff requests for courses more relevant to the human condition (Robbins 1972) when the rearrangement of the academic year to 2-sessions was introduced in the University of New South Wales in 1973 necessitating changes in courses. The plea for relevance was a widespread phenomenon in the early 1970's with the sudden world recognition of the population, energy and resource crises. Courses relating to human biology, even whole degree programmes, were introduced about this period in a number of Universities in Australia, e.g. A.N.U. (Evans 1973); Western Australia (Freedman & Allbrook 1974); and in other Universities (Adamson 1977). A similar interest in human oriented courses was shown in Great Britain where these were introduced into 26 tertiary institutions (Connolly 1972) and in U.S. and Canada such courses were already widespread. These human biology courses often had similar aims but the content emphasis differed and teaching methods used were many and varied. The wide acceptance of a broadly based course relating to man and the world in which he lives as being a suitable academic exercise for students whether they intend becoming professional biologists or not was clearly indicated.

Criticisms of traditional teaching methods in Higher Education during the 1960's (Beard 1972; Stevens & Jevelli 1975) led to the development of many new methods of teaching biology. New strategies ranged from use of the audio-tutorials pioneered by Postlewhaite et. al. (1964) based on tape-slide programmes in conjunction with some face to face teaching, an approach modified for use by many, e.g. (Carré 1969, Brewer 1970, 1974, White 1973); to television replacing live lectures (Broadbent and Keulemans 1969), open experimental and external laboratory courses (Adamson and Mercer 1970) introduction of small group discussions or tutorials (Beard 1972, Fleming and Stuckey 1972), Open University and external studies, programmed learning or self-paced learning, e.g. Keller plan (Keller 1968), or a multi-media skills system (Heflin and Scheier 1968), and others.

Many new forms of instruction became available with the great advances in technology in the 1960's and 1970's (Page 1971). Ready access to tape recorders, television, videotape, an enormous increase in literature, photo-

6.2 Evaluation

Ideally, when constructing a curriculum, it is desirable to trial it on a few classes and revise it until it meets requirements before presenting it to large numbers of students (Hermann, Richardson and Woodhouse 1976). Since this course covered a completely new syllabus it was not possible to follow this procedure for fear of disadvantaging one or more student groups. The problems resulting from lack of a small trial were obvious in the first year of the course where the trial group was the whole of the first year student intake. This influenced the evaluation but proved very valuable when revising the course for 1975-76, particularly for laboratories as the difficulties of producing equipment, experiments etc., suitable for such large numbers was already realised. The work entailed in carrying out such extensive evaluations has been of value and the response from students and staff has shown that they willingly accept the opportunity to express opinions. Students who fail and repeat the course have commented on improvements, or in some cases criticised the changes, giving an additional type of feedback.

Gagné and Briggs (1974) consider that the primary reasons for evaluating any course are to find out -

- a. to what extent the stated objectives have been met.
- b. in what ways and to what degree it is a better course than the one it supplanted.
- c. what additional effects it has had.

The evaluation carried out in the development of the course, Biology of Mankind, did provide feedback for all these aspects and covered the two major roles of curriculum evaluation (i.e. Formative and Summative) (Scriven 1967).

Our formative evaluation, i.e. of the development phase, feasibility of course implementation, etc., was not as extensive as desirable, since a trial using the small numbers recommended by Hermann et al. (1976) was not possible. During the 3 years of the evaluation, however, each year acted as a trial in the sense that improvement and evaluation of resources, etc., has been necessary. Suggestion books for both staff and students enabled us to detect sections and aspects of the course which needed to be discarded or revised each year. Discussions during and at the end of the course with all levels of staff contributing to the teaching gave valuable feedback as well as creating an atmosphere of greater involvement by staff. Considerable modifications, particularly in laboratory work, were made as a result of

this form of evaluation, particularly between 1974 and 1975 and again in 1977.

The summative evaluation, i.e. effectiveness of the instructional system and course curriculum at the end of the course, obtained from questionnaires to students and staff at the end of each year, aimed at determining the effectiveness of the teaching methods, the value of the course content and whether the objectives had been achieved.

The evaluation of the course was both objective and subjective. In the main areas of student response, particularly of dissatisfaction, the objective figures correspond very closely to the subjective assessment of staff teaching the course. The objective evaluation may well be more qualitative than quantitative. This is probably due to lack of precision in defining exact objectives for the various parts of the course and then assessing student response to achievement of the specific criteria. This is one area that merits more attention.

The students' view of course content is a matter with a wide range of implications. How far student expectations of a first year course can be or should be met is a philosophical as well as an educational issue. It is difficult to see how, with varied and fairly restricted backgrounds, student anticipations should be a major determining factor in shaping the course content. Students, particularly in their first year at University, are limited in their knowledge of the total depth and extent of a subject, and they do not recognise where the course is expected to lead in subsequent undergraduate years. They have little knowledge of the information and expertise they will need as they join the workforce after graduation, or what may be required of them as a member of society.

The teaching methods used provided most detailed information. The whole question of lectures *per se* is raised with considerable force. Though it is not clear which causes most concern - the lectures as such, the large size of audiences, or the ability of lecturers to lecture. This would be very difficult to analyse as it would require a large series of parallel groups undergoing different lecturing procedures. Even then the underlying assumptions might make any detailed results uninformative. Whether lectures presented by television are less acceptable than live ones is also not clear from the data as locations and methods of replay as well as the standard of programme production etc., may have influenced the reaction.

We found that offering students greater opportunity for independent study in the form of reading alternatives to lectures, by removing a timetable

restriction on areas of work e.g. by use of Demonstrations and Audio-Visual programmes, and by encouraging co-operation in collection of data or materials for use in some laboratory classes, benefitted the best students and sorted out those less able to organise their own time. From the evaluation it was clear that less than half the students listened to an audio-visual programme or carried out a reading programme which was not timetabled at a particular time. For scheduled lectures an average of between half and two-thirds of the student body attended any one lecture although many of those attending did not listen (i.e. actually talked or did other work). The offer of a lecture alternative and lecture summary could account for those absent in the case of lectures but not for those who did not listen to the audio-visual programmes.

Our attempt to expand student reading in preparation for tutorials suited the better students and exposed those unprepared to put effort into the course. This was clearly reflected in the essay assignments and the level of discussion in tutorials.

The poor response of students to audio-visuals is interesting. Two factors probably operated here, the lack of discipline of students to timetable themselves to carry out unsupervised work and less familiarity with the use of equipment than was realised. Since these programmes were equivalent to lectures and contained additional required information not available elsewhere, poor student use of them was surprising. A closer analysis of this problem is required.

The evaluation of tutorials established certain trends in the structure of small group tutorials and student reaction to the group processes. Analysis of a sample of groups would be needed to see whether student opinions were an accurate reflection of their actual performance.

More detailed attention to feedback mechanisms is clearly required and more work is needed in this area to separate feedback from assessment both in practice and in the perception by students. Whether students properly appreciated some of the possibilities raised in the questionnaires is another matter that needs further investigation before too much weight is placed on the statistical results.

Further exploration of student reaction to this course at the end of their undergraduate career compared with their reaction at the end of their first year could provide valuable data. This would be of particular interest

in the case of students who major in biology. It might enable some answers to be given to whether, in retrospect, students saw the course as having more value and meaning when compared to their first reaction.

The correlation between various methods of evaluation has been encouraging. The informal feedback from students and staff of a more subjective nature have been paralleled in responses to questionnaires. This has given added confidence to the reliability of such surveys.

Evaluation of the course compared with other courses is not possible - and probably would not be profitable. When the course is evaluated against its own objectives, there would seem to have been a fair measure of success. Some of the obvious problems have shown significant improvement over the three year period. Some of the other causes for dissatisfaction with the course are due to other circumstances which cannot be altered readily.

From the current evaluation, problems which needed consideration for 1977 concerned several different areas. The increase in the number of students with a limited background in Biology began to be a significant factor as the number has increased to 150 students. There was continued disenchantment with formal lectures, but there was little use made by the students of the self-instructional alternatives such as audio-visual programmes. Further investigation to discover the basis of criticism and possible remedies is required. In curriculum planning more careful analysis of the subject matter is needed to achieve a balance between student background and their expectations. Staff expectations and student achievements need to be better co-ordinated, particularly where the preparation required to achieve set objectives may be beyond the capabilities of all but the most able student.

We agree with Ahmann (1967) that curriculum developers and educators are tempted to de-emphasise evaluation because of the complex problems involved and the time required to carry it out effectively, but although the role of evaluation is a secondary activity it is still one which need a major share of attention in course development.

6.3 Successes and Failures

Success is difficult to define but many students and some staff believe that the course in spite of its problems was of great value as an introduction to biology. It was felt that intellectual and oral skills,

broadening of student outlook and the development of critical thinking using a variety of learning approaches was achieved in a large proportion of the student body. This achievement was measured not only by student success in exams, standards in essays and attitudes to practical work but by our observations of the change in ability of students to use the library, to discuss subject matter and the increase in general perception of the problems of man in his environment.

Among the most important achievements for this course when compared with previous ones have been the development and improvement of materials for use in small group tutorials, the increase in the confidence of staff in handling tutorials and the broadening of the reading of students from a single text book to a range of literature. These gains have been carried into the second session course Comparative Functional Biology in which the content covers more traditional biology but tutorials are still in small groups and extended reading is required. Many of these benefits will be significant in student attitudes and ability to cope with courses in later years.

Staff also gained from the experiment, particularly those involved in the development of teaching materials, and tutorials and laboratories. The nature of the course broadened their view of biology, led to self-questioning of attitudes to world problems, opened up an enormous field of literature and offered an opportunity for close personal interaction with a wide range of people and ideas. It also taxed their ingenuity for devising experiments and laboratory classes, preparing demonstrations and teaching materials of various kinds. The greater involvement of the staff working as a team, defining objectives, questioning strategies used, analysing achievement of aims, led to a greater awareness of the value of educational technology in the total teaching and learning process.

There have been criticisms of the course. It has been regarded by some staff and students as more anthropology and sociology than biology. Care was needed to make clear the biological orientation and to emphasise the scientific analysis required before objective interpretation of general questions such as pollution, energy cycling etc., could be found, so that the course did not degenerate into too superficial an approach to such a large topic. Staff were particularly worried at the difficulty they found in keeping abreast of an increasing volume of literature on a wide range of

aspects of biology for which their own training gave them only limited background. All biology is expanding so rapidly that these same difficulties in teaching can be criticisms of any first year course in the subject. The course was further modified in 1977 with a greater emphasis on an ecological approach introduced as a result of the different interests of staff writing the materials. Objectives were more detailed and feedback to students improved.

There were losses too. For some students the requirements were too great or in some instances outside pressures led to failure or dropping out of the course. The proportions of students withdrawing in 1975 and 1976 however, were not very different from previous years before the course was introduced. In fact, a significant and increasing proportion of students in the faculty of Science and Arts in 1975, 1976 and 1977 chose to take Biology of Mankind.

When questioned at the end of 1976 a fair proportion (38%) found the course as interesting or more interesting than the more traditional biology course Comparative Functional Biology (14% more interesting; 22% as interesting). Since only 51% of students in 1976 intended majority in any biological subject this means that almost half (49%) of the students taking biology do so for interest as a fill-in subject towards their degree.

Student reactions were often related to their previous background. Some of those with Web of Life for the HSC felt the subject matter was too familiar as in some schools topics had been covered in greater depth. Those wishing to specialise sometimes felt frustrated, as first year students often do, believing that as soon as they enter University they should begin using elaborate equipment and specialised techniques. There were many mature age students with no biology, graduates taking the course out of interest, some having no idea what biology really entailed, who felt that it was a most important experience, one of value for all University students, some even believing it should have been made a compulsory subject for all students. These conflicts in attitude were similar to those of the staff. Much of the criticism was aimed more at the relevance of the course as a basis for intending professional biologists than at its interest or value to first year students as a whole.

Some staff regarded the course as providing an inadequate basis for progression for professional biologists. This dissatisfaction increased in 1977 and resulted in the introduction of a Cell Biology course in 1978 to balance the Comparative Functional Biology course with the result that the Biology of Mankind course was discontinued after 1977. However, many of the teaching techniques, methods of display of materials for students, use of small group tutorial methods pioneered in Biology of Mankind will continue to be used in the teaching of first year biology.

When seen in overall perspective, there seems to be clear evidence that the course provided an alternative to the traditional descriptive biology course in both subject matter and teaching methods and laid a sound basis for first year students to lead them into more specialised aspects of biology. It functioned to bring together knowledge from different disciplines and to evaluate this knowledge in terms of the human situation, informing students of the widespread applications of biological knowledge to man. It also provided the framework for the learning of scientific method and biological principles necessary for any understanding of biology.

When viewed in terms of its original objectives it can be said to have succeeded because it stimulated students, offered an element of novelty and not merely followed school experience, was challenging and relevant, provided a broad educational platform rather than a narrow scientific viewpoint and gave students an understanding of themselves as individuals in a community as part of the total environment.

The course has been challenged on its provision of a sound basis for other courses and also partly on the objectives around which it was designed. Part of the original philosophy of the course was "that an initial course in "human" biology could provide a sound educational framework, a good basis for later courses, and an interest and relevance which would be more difficult to achieve under the guise of more conventional courses in either 'organismal' or 'cellular' biology. For us, familiarity breeds relevance and we believe that a serious study of the human condition should be an initial step in the 'breeder' reaction which will hopefully culminate in a well educated and trained biological scientist". (Submission to Faculty Biological Sciences Oct. 1972 by D.J. Anderson and E.M. Russell).

If these premises are accepted, then the course can be claimed to have been successful. The disagreement with these objectives has led to the replacement of the course. It remains to be seen whether these objectives will reappear in the future as the motivation for a similar course.

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APPENDIX 1.

Publications produced for use by students in the Course 17.011 Biology of Mankind. Copies are located in the Main Library under First Year Biology.

Begg, R.J. (ed.) 1975

Students Laboratory Manual

Day, L. (ed.) 1975

Student Study Guide

Anderson, J.M.E. (ed.) 1976

Students Laboratory Manual

" " " 1976

Student Study Guide

Journet, A.R.P. (ed.) 1977

Students Laboratory Manual

" " " 1977

Student Study Guide

APPENDIX 2
CONTENTS OF STUDY GUIDE 1976

TIMETABLE FOR THE COURSE

A. GENERAL INFORMATION

1. Introduction
2. Aims
3. Information presentation
 - a) Lectures
 - b) Lecture alternative
 - c) Supplementary information
 - i) Audio-visual programme (A.V.)
 - ii) Reading programmes (R.P.)
 - iii) Demonstrations (D)
 - d) Tutorials
 - e) Laboratory classes
 - f) Reference list
4. Assessment
5. Guide to the Writing of Essays
6. How to Get Help
7. Lecturers

B. BASIC REFERENCE LIST

C. WEEKLY GUIDE TO THE COURSE

- Week 1. The Present Situation
- Week 2. Ecosystems and Energy Flow
- Week 3. Evolution of Man
- Week 4. Development of Hunter/gatherer Society
Assignment 2
Assignment 3
- Week 5. Development of Agricultural Man
- Week 6. Methods of Utilization of Natural Resources
- Week 7/8 Urbanization
- Week 9. Population Structure
- Week 10. Population Control and Genetics
- Week 11. Biological Stress
- Week 12. Disease
- Week 13. Impact of Society on the Environment
- Week 14. Management of Resources

APPENDIX 3
BASIC REFERENCE LIST

TEXTS

- Abercrombie, M., Hickman, C.J. and Johnson, M.L. *A Dictionary of Biology*. Penguin.
- Boughey, A.S. 1975. *Man and the Environment*. Macmillan.

PRINCIPAL REFERENCES

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- Scientific American. 1972. *Biology and Culture in Modern Perspective*. Freeman.
- Weiner, J.S. 1971. *Man's Natural History*. Weldenfeld and Nicolson.
- Whittaker, R.H. 1975. *Communities and Ecosystems*. Macmillan.

APPENDIX 4
WEEKLY GUIDE TO THE COURSE

Each weekly unit contains the following information:

1. Introduction placing theme in perspective with course as a whole.
2. Aims
3. Reference List - including lecture alternative (φ) and primary tutorial (*) also extension references.
4. Lecture Summary
5. Supplementary Information e.g. Reading Programme, A.V. programme.
6. Tutorial - Discussion sheet -
 - (a) aims
 - (b) introduction and questions
7. Assignments

APPENDIX 5
ASSESSMENTS
FROM STUDY GUIDE 1976

- (a) All aspects of work will be considered in the final assessment. The following is a list of forms of assessment and their respective values. Weeks in which these assignments or tests will occur are found in the teaching programme -

Assignments (3)	20
Written Laboratory Work	30
Short Tests on Laboratory	
Work (3)	
Final Exam (90 multiple choice questions)	<u>50</u>
Total	<u>100</u>

Please note that as well as receiving a possible 30% of your mark for laboratory work, questions on the concepts and techniques covered in the laboratory will be included in the final exam. This practical component may be up to one third of the total paper. Students whose practical work is unsatisfactory will not pass the course.

Please check the teaching programme and weekly guide carefully for due dates on assignments etc., and who is responsible for collecting your work (Tutor, Supervisors etc).

(b) Assignments

The essay assignments during Session I aim to help you to summarise and synthesise relevant sections of the course and in particular the material covered in tutorials. They will also give experience in selecting and organising information and will develop your ability to communicate.